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# MEASURED RESULTS OF SUPERVISED STUDY

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## INTRODUCTION AND STATEMENT OF PROBLEM

Probably no other movement, unless it be the junior-high-school movement, is arousing more interest among students of secondary education than the movement for supervised study. Dating its inception from the beginning of the Batavia plan in the late nineties, receiving new impetus from the work of investigators and progressive school men since 1910, this movement during the last five or six years has attracted a rapidly increasing amount of attention, certainly more than any other proposed reform in the field of secondary-school methods of instruction.

When, therefore, some three years ago, Professor C. H. Judd, addressing the Michigan Schoolmasters' Club, proposed that the members undertake the co-operative study of important high-school problems, the committee<sup>1</sup> which was appointed to act on this suggestion turned quite naturally to the problem of supervised study. In view of the increasingly wide adoption of the method, the claims that were made for its efficiency, and the relatively small amount of experimental evidence in substantiation of these claims, the committee decided to undertake an experimental study, under actual school conditions, with

<sup>1</sup>This investigation was conducted under the auspices of the Michigan Schoolmasters' Club, by which it was financially supported. The committee appointed by Professor C. O. Davis, president of the Club, was as follows: Superintendent W. B. Arbaugh; Professor F. S. Breed, chairman; Professor J. P. Everett; Superintendent E. E. Fell; Superintendent S. O. Hartwell; State Superintendent F. L. Keeler; Principal E. L. Miller; Principal Wm. Prakken; Principal P. C. Stetson; and Superintendent E. C. Warriner. The committee completed the organization of its work at a meeting in Grand Rapids.

*the aim of throwing additional light on the effectiveness of a common form of organization of supervised study, namely, that exemplified in the divided-period plan and the double-period plan.* While selective from the standpoint of differences in subject, these plans are not rigidly selective from the standpoint of differences in ability of pupils. In fact they may be characterized as relatively indiscriminate, not selective, from the standpoint of ability differences. The question might well be raised: Do the divided- and double-period plans represent the limit of differentiation of organization and method in the evolution of supervised study?

The investigation was made possible by the careful co-operation of principals and teachers in the high schools named below. The readiness, even enthusiasm, of their participation was a pleasure to the committee, not only because of the promise it held for the successful issue of the experiment, but also because this spirit seemed indicative of that new era in secondary education when the scientific study of professional problems will be widely welcomed and prosecuted by the teaching personnel in this field. In the opinion of the writer, even now it may be said that the more complete invasion of the secondary field by the scientific methods that have proved so successful in the field of elementary education is being retarded not so much by lagging teachers as by lacking leaders. The list of co-operating high schools follows: Albion; Battle Creek; Detroit Northwestern; Gilbert, Minnesota; Grand Rapids Central; Grand Rapids South; Grand Rapids Union; Highland Park; Holland; Houghton; Muskegon; Port Huron; Saginaw; and Three Rivers.

#### PREVIOUS INVESTIGATIONS

Published reports relating to the efficiency of supervised study may be classified roughly into three groups according as they are based on:

- (1) Unsubstantiated opinion,
- (2) Statistical data,
- (3) Experimental results.

Reports of the first type need not concern us here.

It will be profitable, however, to note briefly a few representative studies of the second type.

Wiener ('14) reported favorable results for the divided-period plan in the Central Commercial and Manual Training High School of Newark, New Jersey. There was no apparent attempt to control conditions during the trial of the method. Conclusions were based on promotion percentages.

Brown ('15) made a similar report for the double-period plan adopted in the Joliet High School in 1910. Conclusions were based on a fairly consistent decrease in the percentage of failures after the adoption of the plan.

Loveland ('15) reported satisfactory results from a trial of the study-class plan which had been in operation in the high school of Pottstown, Pa., for about six years. Non-promotion data for the six years showed a higher average percentage of failures during the last three than during the first three years of the period. The corresponding elimination percentage showed a decrease.

Hall-Quest ('16) on the basis of decrease in the percentage of failures justified the amount of time devoted to the eclectic plan of supervised study in the high school of Cairo, Ill.

Cole ('17) has given an account of one year of supervised study in the Broadway High School of Seattle. A decrease in the percentage of subjects failed, which his data exhibit, was taken as a criterion of the effectiveness of supervised study.

The method of investigation pursued in these studies warrants a brief comment. The object of study in each case was a method of instruction. The method of investigation was comparative. Comparison was made between supervision and non-supervision to determine their relative merits. In a comparison of this sort the superiority of the method is evidenced by its greater efficacy as a means in producing progress or improvement or desired change. Manifestly the most acceptable measure of improvement is a direct measure of it. It is

interesting to note, however, that in all five of the statistical studies referred to, which are typical of the statistical group, promotion rate, in one form or another, was used as the criterion or measure of efficiency. That is, in all of these studies improvement was measured not directly, but indirectly through promotion rate, a method which has been unfavorably criticised by previous investigators.

Implicit in the use of promotion rate as a measure of improvement is the assumption that there is a very close, if not exact, correspondence between rate of promotion and rate of improvement. This assumption still awaits verification. It will probably be found invalid. The percentage of pupils passing, or the promotion rate, is determined by many factors in addition to improvement. Promotion rate, like the passing mark, where properly determined, depends primarily upon the educational aim. According as the aim is the education of leaders, education of the masses, maintenance of standards, and so on, the passing mark will vary. Furthermore, in the opinion of investigators and practical experts, pressure of numbers, limitations of space, force of tradition, size of pupils—these and other factors enter into the situation as additional determinants. Examine, for example, the following samples of decreases in the percentage of failures on which Hall-Quest above justified the plan of study supervision in vogue at Cairo, Ill.:

Algebra I,	28-23 per cent
Latin I,	33-25 " "
Stenography I,	24- 0 " "
Bookkeeping I,	25- 0 " "

That is, Algebra I and Latin I, not ordinarily supervised and ordinarily thought to lend themselves easily to a program of supervision, showed decreases of failures of 5 and 8 per cent, respectively; while stenography and bookkeeping, ordinarily

supervised to a considerable extent, showed decreases of 24 and 25 per cent, respectively. One is led to suspect that factors other than improvement affected these decreases. It is easily conceivable that the percentage of failures in a given school might, within a brief term of years, be greatly decreased with no concomitant variation in the amount of improvement of pupils.

These statistical studies, therefore, are open to two fundamental objections:

- (1) They lack the necessary control of conditions,
- (2) They employ an unsatisfactory criterion of improvement.

In the secondary field little has been done experimentally on the problem of supervised study. Breslich ('12) conducted the first important experimental investigation. His study was made in the University High School of the University of Chicago. He used two comparable classes in first-year algebra, one of which was given supervised study without home work, the other home work without supervised study. The more significant results were derived from fourteen lessons. His essential conclusions were:

- (1) That there was a slight average gain for supervised study, and
- (2) That poor students profited particularly by it.

The experimental data seem to warrant a definite statement to the effect that good students evidently lost by the method, about which something will be said in a later section of this report.

Minnick ('13) tested supervised study in Bloomington, Ind., with two groups in plane geometry, of equal ability as determined by previous grades in algebra. On the basis of both recitation and examination grades for a period of fifteen

weeks, the average performance of the supervised class surpassed that of the unsupervised. No separate study of bright and dull pupils was made.

In both of these experiments important conditions were carefully controlled and a direct measure of improvement was employed.

In view of the inadequacy of the statistical method in connection with the present problem, in view of the fact that the important experimental studies of the problem are limited to two in the secondary field, in view also of the fact that these in turn are limited to a study of only two classes each, and in one case to a period of only three weeks so far as the essential findings are concerned, it is evident that there is need for a more considerable body of experimental data upon which to base conclusions regarding the effectiveness of supervised study.

#### METHOD AND MATERIAL

*General plan of experimentation.*—After the co-operation of the desired schools had been secured, the principals of these schools and the teachers who had consented to take part in the experiment were provided with mimeographed copies of the following general directions for the conduct of the experiment:

#### GENERAL DIRECTIONS

1. Conduct the experiment in first-year Latin, first-year algebra, or ninth-grade English composition.
2. In the selection of classes for the experiment, give preference to the slower sections.
3. Employ the divided-period plan of supervising study, for which use
  - a) A one-hour period (50 minutes can be adapted), of which
  - b) The recitation shall occupy 30 minutes,
  - c) Assignment and supervision of study the rest.
4. Assignments, now stressed more than ever, should be made unusually definite and clear.

5. Supervision of study follows the assignment and includes attention both to subject-matter and to methods of learning.
6. Provide the teacher with a list of definite practical rules on "How to Study" (the committee will furnish these), based on scientific studies of the learning process.
7. Have the teacher master these rules and help the pupils to apply them in the course of their study.
8. Select for the supervision of study teachers who are known to be interested
  - a) In undertaking the experiment, and
  - b) In teaching pupils how to study.
9. Use one of the following plans of experimentation:

## PLAN I

- a) One teacher.
- b) Two sections of the same grade, of equal size, and of equal ability as determined by
- c) Preliminary test alike for both sections, devised by the teacher. (Shift pupils so that the average scores of the sections are, as nearly as possible, the same. Mid-year marks in the subject chosen for the experiment may be used instead of the preliminary test, where the sections have had the same mid-year examination paper.)
- d) Sections to be known as A and B.
- e) Section A, practice group, one-hour (or 50-minute) period, with supervised study, time distributed according to Direction 3.
- f) Section B, control group, length of period same as in Section A, ordinary recitation.
- g) Both sections, with subject-matter the same in kind and amount (the amount had better be a little too large than too small), continue work for six weeks, then
- h) Semifinal test, same for both sections, devised by teacher.
- i) Now, under the same teacher, reverse the procedure for the next six weeks, giving supervised study to Section B, the ordinary recitation to Section A.
- j) Both sections cover the same work.
- k) Final test, same for both sections, devised by teacher.



- l*) Construct all tests so that nobody can do everything and everybody can do something. A series of questions differing in difficulty, but not necessarily arranged in order of difficulty, will meet this condition best.
- m*) All test papers, with questions, to be forwarded to the Education Laboratory of the University of Michigan for a second scoring which will be averaged with the teacher's scores.
- n*) Teacher will report scores on blank provided especially for the purpose.

## PLAN II

- a*) Two teachers.
- b*) Two sections of the same grade, of equal size, and of equal ability as determined by
- c*) Preliminary test alike for both sections, devised by the two teachers in co-operation. (Shift pupils as above. Mid-year marks may be used, as above.)
- d*) Sections to be known as A and B.
- e*) Teachers to be known as X and Y.
- f*) Section A, with Teacher X, practice group, one-hour period (or 50-minute), with supervised study, time distributed according to Direction 3.
- g*) Section B, Teacher Y, control group, length of period same as in Section A, ordinary recitation.
- h*) Both sections, with subject-matter the same in kind and amount (the amount had better be a little too large than too small), continue work for six weeks, then
- i*) Semifinal test, same for both sections, devised by teachers in co-operation.
- j*) Now exchange teachers, assigning Teacher Y to Section A and Teacher X to Section B, continuing supervised study in Section A and the ordinary recitation method in Section B.
- k*) Both sections cover the same work, six weeks.
- l*) Final test, same for both sections, devised by the two teachers in co-operation.
- m*) Construct all tests so that nobody can do everything and everybody can do something. A series of questions differing in difficulty, but

not necessarily arranged in order of difficulty, will meet this condition best.

- n) Forward questions and papers to the Education Laboratory of the University of Michigan.
- o) Report scores on blank provided.

Both of the above plans involved the use of two classes. After the classes were made comparable in ability and subject-matter, the teacher variable was the important one to control. Plan I seemed to be the best of several possible plans because of its simple control of this variable through the use of only one teacher, and also because of its adaptability to ordinary school conditions. The exchange of methods at the semifinal in this plan operated as a control of class variability additional to testing.

Plan II, with two teachers instead of one, and exchange of teachers instead of methods at the semifinal test, was inferior to Plan I from both the scientific and the practical point of view. The teaching was less constant in quality in Plan II than in Plan I, and the exchange of teachers involved a procedure that would not ordinarily be approved by supervisors. This plan, however, permitted comparison of the two methods in question when subject-matter was identical, variation in teaching was equalized by the law of averages, and classes were equalized in ability by test.

Either one of the plans described seemed to offer advantages over other possible plans such as arranging (1) two classes with two teachers and providing for exchange of methods, (2) two classes with two teachers and exchanging both methods and teachers, and (3) one class with one teacher, changing the method, and with it, necessarily, subject-matter.

Since it was already manifest at the time the experiment was undertaken that teachers find considerable difficulty in acquiring the technique of supervising study, the list of general

suggestions given below was provided along with the general directions. These suggestions were meant to embody the theory and practice of the divided-time scheme of supervision, as explained in the published descriptions of its advocates. No attempt was made to keep the suggestions logically distinct. Practical suggestiveness was the purpose of the list, not logical analysis.

#### SUGGESTIONS FOR THE SUPERVISION OF STUDY

Supervision of study means:

- Correcting the defects of mass-teaching;
- Individualizing instruction;
- Recognizing the psychology of individual differences;
- Supervising study *in the teacher's classroom*;
- Directing the pupil's effort;
- Anticipating the pupil's difficulties;
- Working *with* the pupil, but not *for* him;
- Helping the pupil *judiciously*;
- Training pupils how to study;
- Making a real laboratory of every classroom;
- Increasing the importance of the assignment—so much so that supervised study has been described as giving an elaborate and co-operative assignment;
- Inspecting the work of the pupils as they study the assignment;
- Devoting most time to the lowest third of the class;
- Giving extra work or practicing the doctrine of the limitation of training in the case of the highest third;
- Decreasing the amount of home study;
- Increasing the amount of school study;
- Proceeding, in general, somewhat as follows:

“The pupils have begun to work. The getting ready process must be prompt and precise with a minimum of noise. No questions are permitted audibly, but by raising the hand the pupil indicates a desire to consult the teachers who passes quietly to the pupil's desk. The pupil and teacher in whispers confer on the difficulty. When not so occupied, the teacher moves quietly up and down the aisles stopping at each desk to inspect each pupil's work. When she finds a pupil employing a wrong method, she stops and in low tone,

asks why he used this method. She always requires the pupil to give a reason for what he does. The pupil is expected to make his own corrections with a minimum of suggestion from the teacher. When absolutely necessary to do so, she will give the required information. There is nothing gained under such circumstances by sending the pupil on a long hunt for the facts. Valuable time is saved by telling him what he probably could not have discovered for himself."

Finally, in the matter of method, each participating teacher was provided with a mimeographed list of rules to be used in instructing pupils how to study. These, thirty-seven in number, were taken from Whipple.<sup>1</sup> These rules were selected, first, because it was desired to make the teaching as scientific as possible, secondly, because it is evident that the psychology of learning constitutes the scientific basis for instruction in methods of study, and, lastly, because Whipple's list is a convenient and reliable list based on this psychology.

*Some variations from the general plan.*—The experiment as thus outlined, with the following exceptions or variations, was conducted during the second semester of the regular school year. Although no school was asked to carry out the experiment in more than one subject, three schools attempted it in two subjects each. While the divided-period was recommended, schools preferring or already using the double-period plan were accepted, for it was recognized that no fundamental requirement of the experiment was violated by this variation. Though there was some variation among schools in the length of class periods, this difference was of no significance, because comparisons were not made between schools.

The schools very generally chose Plan I in preference to Plan II. This was due, no doubt, to the requirement in Plan II that the teachers of sections be exchanged during the semester. One school, however, carried out Plan II satisfactorily. There was some variation from the six-week period between

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<sup>1</sup>G. M. Whipple, *How to Study Effectively*, Public School Publishing Co., Bloomington, Ill.

the preliminary and semifinal, and between the semifinal and final tests. On account of the position in the calendar of a vacation or a regular monthly test, the specified period was in a few cases slightly modified. But, again, compared groups were treated with uniformity in this respect. Variations of the kind described were permitted in order that the experiment might be adjusted as naturally as possible to the regular work of the schools, the principles of scientific procedure alone taking precedence over this principle.

With these variations the general scheme of experimentation, as outlined, was undertaken in the hope that it might be possible to measure the value of supervised study, of the type specified, in good high schools under ordinary school conditions, when the method was employed by willing and capable teachers few of whom pretended to expertness in the technique of study supervision.

#### RESULTS

*Reporting data and scoring papers.*—The schools co-operating in the experiment reported their data on a printed blank  $8\frac{1}{2} \times 17\frac{1}{2}$  inches, provided by the committee. This blank is reproduced below:

#### REPORT BLANK

**DIRECTION:**—Use one copy of this blank for the preliminary and semi-final scores, another for the final scores. As soon as possible after the semi-final test, and also after the final, forward copies of the tests, the students' papers, and the report to F. S. BREED, Department of Education, Tappan Hall, Ann Arbor, Michigan.

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High School.....Grade.....Subject.....  
 First or second half-year in subject.....No. of periods per week.....  
 Length of period.....minutes, Recitation.....minutes,  
 Supervised study.....minutes, Divided or double period.....  
 Experimental plan, I or II.....No. of weeks, preliminary to semi-final....  
 Semifinal to final.....

SECTION A					SECTION B				
[ ] Supervised Study					[ ] Supervised Study				
[ ] No Supervised Study					[ ] No Supervised Study				
Teacher.....					Teacher.....				
SCORE IN TESTS (In percentage)				IMPROVE- MENT (Leave vacant)	SCORE IN TESTS (In percentage)				IMPROVE- MENT (Leave vacant)
DATE					DATE				
NAMES OF PUPILS (Arrange alphabetically)	Preliminary or mid-year	Semifinal	Final		NAMES OF PUPILS (Arrange alphabetically)	Preliminary or mid-year	Semifinal	Final	

As will be noticed in an examination of the general directions and the report blank, the teachers were asked to send the test questions and the pupils' test papers, along with a report of the individual scores in all tests, to the writer. The papers, which gave evidence of having been carefully scored, were all scored a second time by competent persons in accordance with specifically prepared instructions. These scorers were selected on the basis of scholarship, practice or study of teaching, and specialization in the field in which the papers were written, and were paid for their work. The same individual in each case scored all the papers of two compared classes.

*Results based on continuous groups.*—A careful examination of the data showed that there would be little value in a method of treatment of results that assumed classes as grouped by the teachers to be strictly comparable. This situation was further complicated by the fact that there were many classes in which absences occurred on the date of tests. Instead, therefore, of using for each test averages based on percentages of all pupils for whom there were records, and thus using data derived from a partially different set of pupils in each test, it was decided to construct the first tables of results on the basis of what shall

be called, for want of a better term, *continuous groups*, that is, groups composed of those pupils who participated in all the tests and including no others.

Three sets of averages were computed for these continuous groups—one from the teachers' scores, another from the laboratory scores, and a third, termed the combined score, from these two averages. Final judgments were based primarily upon the combined score.

Table I shows the results for twenty first-year algebra classes in terms of percentage of excess of improvement when the classes were compared on the basis of continuous groups. The following references to the table will indicate how it should be read: In High School IV the two classes compared had enrollments of 11 and 13, respectively; the frequencies or numbers in the continuous groups were 11 and 12; the preliminary scores for the continuous groups were 81.5 and 81.4 per cent, the former being the preliminary percentage of the supervised group, the latter of the unsupervised. From the preliminary to the semifinal test the average improvement of the supervised group exceeded that of the unsupervised by 12 per cent, according to the teacher's scores; by 10.1 per cent, according to the laboratory scores; and by 11.1 per cent, according to the combined scores. In the next section of the table, Preliminary to Semifinal (B), the above values are repeated for the sake of clearness, with the omission of values for those classes that failed to reverse the method or continue the experiment after the semifinal test. The last section of the table shows the relative improvement from the semifinal to the final test for the same groups as appear in the preceding section, after unsupervised study had taken the place of supervised and vice versa. The percentages representing excess of improvement per pupil in the same order as before are 9.8, 13.3, and 11.6, no allowance being made for unequal

standing at the preliminary test. In both periods of the experiment improvement was computed from the preliminary scores. In later tabulations allowance is made for semifinal gains and losses in computing final gains and losses.

In the two columns of averages are inserted the average percentages of excess per pupil under the two methods. The excess percentages of ten supervised groups averaged by the combined scores 3.2 (middle column); the excess percentages of the ten unsupervised groups, according to the combined scores, averaged 3.3. The net excess of improvement, computed from the combined scores, was thus inappreciably on the side of unsupervised study.

In five pairs of classes supervised study showed the greater relative gain; in the other five, unsupervised study. When in the same manner the results for the fourteen groups that completed both parts of Plan I are considered, it is observed that from the preliminary to the semifinal test the unsupervised groups showed, if anything, a shade of advantage over the supervised, and when the methods in the compared groups were exchanged, the unsupervised classes exhibited the pronounced average excess of improvement of 5.1 per cent. No class having supervised study between the semifinal and final tests equaled or exceeded in improvement its corresponding unsupervised class. So much for the results of supervised study in the algebra classes, when based on continuous groups.

In Table II are presented the results from six first-year Latin classes when treated by the same method. It will be observed that the net excess of improvement was markedly greater on the side of supervision from the preliminary to the semifinal test—10.3 per cent when the results from six classes were considered, and 9 per cent when four classes were considered. From the semifinal to the final test the classes that





**TABLE II**  
**PERCENTAGE OF EXCESS OF IMPROVEMENT IN CONTINUOUS GROUPS UNDER**  
**SUPERVISED AND UNSUPERVISED STUDY IN FIRST-YEAR LATIN**

Character of Class Data	HIGH SCHOOL			Av.	HIGH SCHOOL			Av.
	I	IX	X		I	IX	X	
Enrolment.....	13	19	17	16.3	13	15	17	15
Frequency.....	13	16	14	14.3	12	13	14	13
Preliminary score.....	87.4	86.7	64.7	79.6	85.5	84.8	74.1	81.5
Preliminary to Semifinal (A)								
Excess of Improvement	Supervised				Unsupervised			
By teacher's scores.....	1.9	11.1	18.8	10.8	.....	.....	.....	0.
By laboratory scores.....	5.7	14.0	9.0	9.9	.....	.....	.....	0.
By combined scores.....	3.8	12.6	13.9	10.3	.....	.....	.....	0.
Av. net excess.....	.....	.....	.....	10.3	.....	.....	.....	.....
Preliminary to Semifinal (B)								
	Supervised				Unsupervised			
By teacher's scores.....	1.9	.....	18.8	10.7	.....	.....	.....	0.
By laboratory scores.....	5.7	.....	9.0	7.4	.....	.....	.....	0.
By combined scores.....	3.8	.....	13.9	9.0	.....	.....	.....	0.
Av. net excess.....	.....	.....	.....	9.0	.....	.....	.....	.....
Semifinal to Final								
	Unsupervised				Supervised			
By teacher's scores.....	.....	.....	5.7	3.0	2.2	.....	.....	1.0
By laboratory scores.....	.....	.....	10.7	5.5	7.9	.....	.....	3.6
By combined scores.....	.....	.....	8.2	4.3	5.1	.....	.....	2.4
Av. net excess.....	.....	.....	.....	1.9	.....	.....	.....	.....

PERCENTAGE OF EXCESS OF IMPROVEMENT IN CONTINUOUS GROUPS UNDER  
SUPERVISED AND UNSUPERVISED STUDY IN NINTH-GRADE  
ENGLISH COMPOSITION

[illegible]

changed from supervised to unsupervised study showed a distinct loss—from an excess of 9 per cent to one of 1.9 per cent.

Table III contains the results computed by the same method for six classes in ninth-grade English composition. The unsupervised classes developed an average improvement per pupil 2.9 per cent greater than the supervised classes during the period from the preliminary to the semifinal test. Two of these classes showed with unsupervised study an excess improvement in the first period of the experiment of 4.4 per cent, and when the methods of study were exchanged, these same two classes dropped in the final test to an excess of .5 per cent over the classes whose study was supervised. In other words, the unsupervised English classes, when compared with the supervised, showed a greater relative improvement in the second period of the experiment as well as in the first period.

[To be continued]